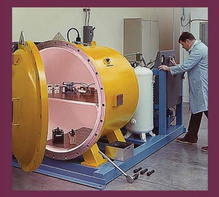
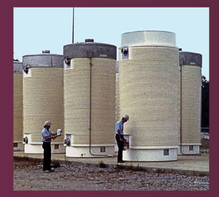
U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

RIC 2013
March 12–14



Office of Nuclear Regulatory Research

Full-Scope Site Level 3 Probabilistic Risk Assessment (PRA) Project

OBJECTIVES

Develop a Level 3 Probabilisic Risk Assessment (PRA), generally based on current state of practice methods, tools, and data that (1) reflects technical advances since completion of the NUREG-1150 studies, and (2) addresses scope considerations that were not previously considered (e.g., multiunit risk).

Extract new insights to enhance regulatory decisionmaking and to help focus limited agency resources on issues most directly related to the agency's mission to protect public health and safety.

Enhance the NRC staff's PRA capability and expertise and improve documentation practices to make PRA information more accessible, retrievable, and understandable.

Obtain insight into the technical feasibility and cost of developing new Level 3 PRAs.

ADDITIONAL INFORMATION

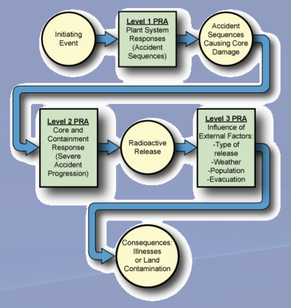
The NRC uses PRA to estimate risk to the public and environment from a nuclear power plant accident by determining what can go wrong, how likely is it for the incident to occur, and what are its consequences.

For the type of nuclear plant currently operating in the United States, a PRA can estimate three levels of risk:

Level 1 PRA—A Level 1 PRA estimates the frequency of accidents that cause damage to the nuclear reactor core. This is commonly called core damage frequency (CDF).

Level 2 PRA—A Level 2 PRA extends a Level 1 PRA to include estimating the frequency of accidents that release radioactivity from the nuclear power plant, and includes details about the nature of the potential radioactive releases.

Level 3 PRA—A Level 3 PRA extends a Level 2 PRA to include estimating the consequences in terms of injury to the public and damage to the environment.



For More Information:

U.S. Nuclear Regulatory Commission, "Research Activity FY 2010–FY 2011," NUREG-1925, Revision 1, Decemeber 31, 201,. ADAMS Accession No. ML1103A000.

U.S. Nuclear Regulatory Commission, "Update on Staff Plans to Apply the Full-Scope Site Level 3 PRA Project Results to the NRC's Regulatory Framework," SECY-12-0123. September 12, 2012, ADAMS Accession No. ML12202B171.


A Dry Cask Storage Installation

Vogtle Electrical Generating Station, Units 1 and 2
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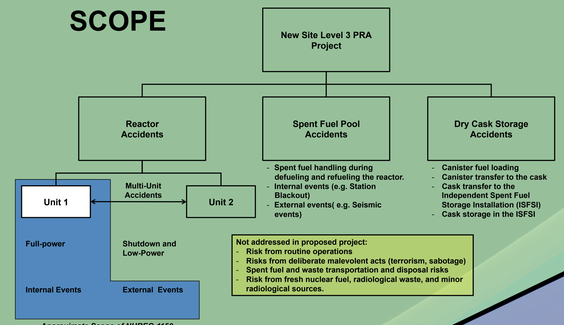
A Spent Fuel Pool

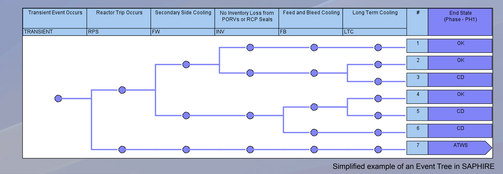
SCOPE



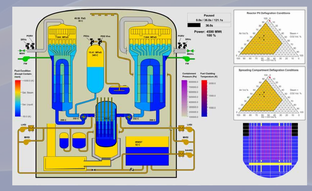
Approximate Scope of NUREG-1150

TOOLS

SAPHIRE can be used to model a plant's response to initiating events, quantify core damage frequencies, and identify important contributors to core damage (Level 1 PRA). In so doing, the analyst can build the PRA model, assuming that the reactor is initially at full power, low power, or shutdown. In addition, SAPHIRE can be used to analyze both internal and external events.

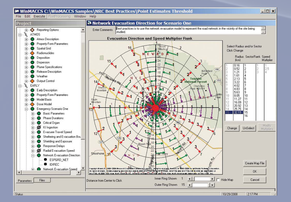


Simplified example of an Event Tree in SAPHIRE

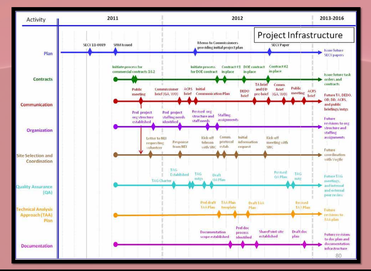

Example of a MELCOR simulation

The MELCOR code is a fully integrated, engineering-level computer code whose primary purpose is to model the progression of postulated accidents in light-water reactors (LWRs), as well as in nonreactor systems (e.g., spent fuel pool (SFP) and dry cask).

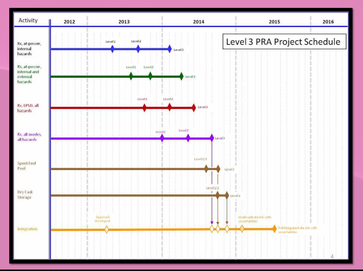
The NRC uses the MELCOR Accident Consequence Code System (MACCS) to estimate the offsite consequences from radioactive material released into the atmosphere.


Example of a MACCS simulation

PROJECT INFRASTRUCTURE



PROJECT SCHEDULE



This current planned project schedule and infrastructure is subject to change. The NRC will continue to hold public meetings periodically to provide the public with status updates on the project's progress.